

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): Polymer/liquid crystal composite material with a holographic grating structure formed by an alternating ordered succession of polymer layers and layers of nematic liquid crystal, characterised in that the said nematic liquid crystal layers comprise a homogeneous nematic monophase region which is substantially free from droplets of liquid crystal.

2. (original): Composite material according to claim 1, characterised in that is obtainable through the operations of:

- exposing a mixture comprising photoinitiator, monomer and nematic liquid crystal to an external agent selected from a temperature change and electromagnetic radiation capable of causing reversible loss of the crystalline order of the mesogenic component of the mixture,
- illuminating the composition through a radiation interference pattern capable of causing polymerisation of the illuminated regions,
- allowing the mesogenic material in the composition to reestablish the crystalline order through a slow decrease in the influence of the external agent.

3. (currently amended): Composite material according to claims 1-~~or~~2, characterised in that it comprises the operations of:

- heating the said photoinitiator, monomer and nematic liquid crystal composition to a temperature above the nematic/isotropic phase transition temperature,
- illuminating the composition through a UV, visible or IR radiation interference pattern capable of causing polymerisation of the monomer,
- slow cooling of the composition below the isotropic/nematic transition point at the end of the polymerisation (curing) process in the absence of curing radiation.

4. (original): Process according to claim 3, in which the said slow cooling of the composition is effected through thermal stabilisation of the composition.

5. (currently amended): Composite material according to claim 3~~claims 3 or 4~~, in which the said slow cooling is effected at a rate of cooling of between 0.1 and 0.3°C/minute.

6. (currently amended): Composite material according to claim 1~~any of the preceding claims~~, in which the layers of nematic liquid crystal contain colouring molecules or particles of nanometric dimensions or other doping agents.

7. (currently amended): Composite material according to claim 1~~any of the preceding claims~~, in which the polymer materials contain photosensitive or conducting or magnetic doping agents or fragments of polymer chains.

8. (currently amended): Composite material according to claim 1~~any of the preceding claims~~, in which the mesogenic component of the mixture contains doping agents capable of causing a reversible isothermic transition within the nematic isotropic phase under the influence of the curing radiation or other radiation.

9. (original): Process for the preparation of a holographic grating formed by an alternating ordered succession of polymer layers and nematic liquid crystal layers, characterised in that it comprises the operations of:

- exposing a mixture comprising photoinitiator, monomer and nematic liquid crystal to an external agent, selected from a temperature change and electromagnetic radiation capable of causing reversible loss of the crystalline order of the mesogenic component of the mixture,
- illuminating the composition with an interference pattern of radiation capable of causing polymerisation of the illuminated regions,

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- allowing the mesogenic material in the composition to reestablish the crystalline order through a slow decrease in the influence of the external agent.

10. (original): Process according to claim 9, characterised in that it comprises the operations of:

- heating the said photoinitiator, monomer and nematic liquid crystal composition to a temperature above the nematic/isotropic phase transition temperature,
- illuminating the composition with an interference pattern of UV, visible or IR radiation capable of causing polymerisation of the monomer,
- slow cooling of the composition below the isotropic/nematic transition point at the end of the polymerisation (curing) process in the absence of curing radiation.

11. (currently amended): Electro-optical device comprising a composite material with a holographic grating structure according to claim 1 ~~any of claims 1 to 8~~.

12. (original): Electro-optical device according to claim 11, comprising a switchable beam diffractor, a wavelength filter or a beam splitter.